



**CTIC**  
Caribbean Tsunami  
Information Centre



Regional Training Workshop on Pacific Tsunami Warning Center  
Enhanced Tsunami Products for ICG/CARIBE EWS  
7–10 December 2015  
Bridgetown, Barbados

# 4.5 Tsunami Warning Center Operations: Sea Level Monitoring in the Caribbean

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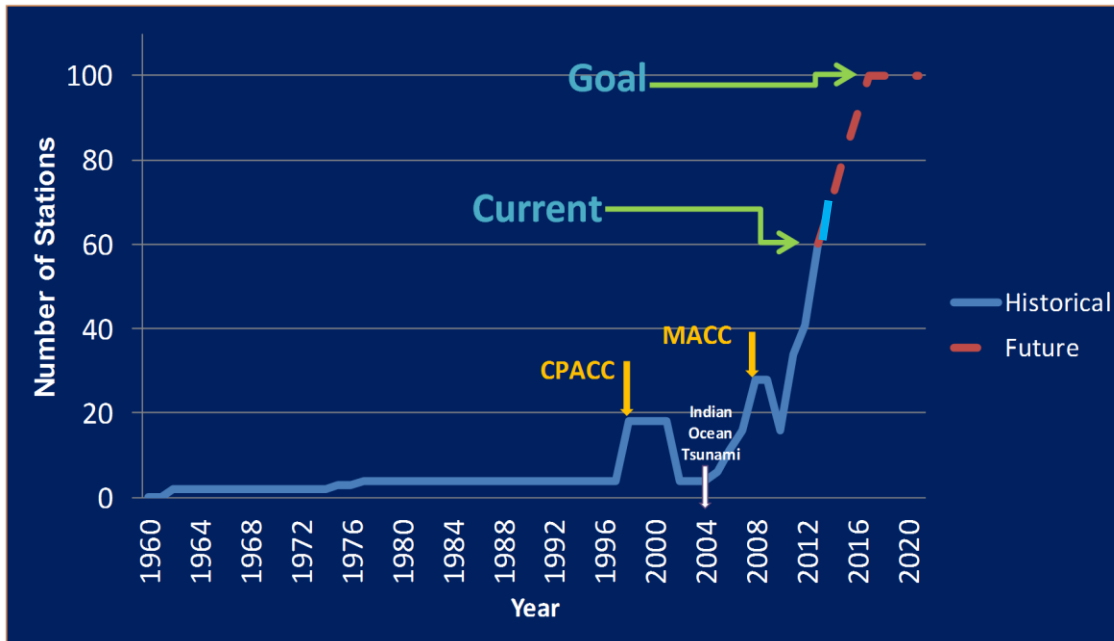
Christa von Hillebrandt-Andrade  
NOAA-NWS Caribbean Tsunami Warning Program

# Status of CARIBE EWS Sea Level Stations 2015



<https://www.google.com/maps/d/edit?mid=zblTjtkDIJIE.ksHCt6U0F6zM&usp=sharing>

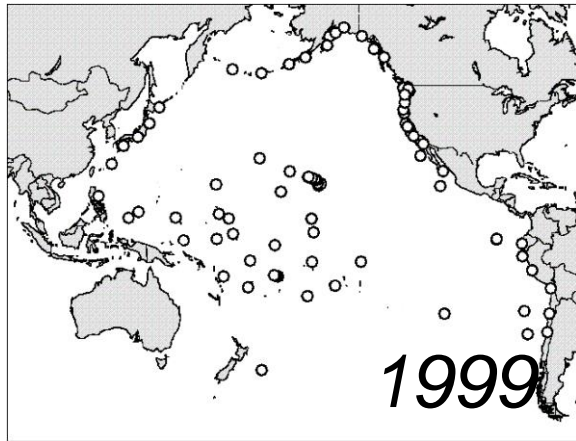
# CARIBE EWS Coastal Sea Level Monitoring Stations Progression (1960-2020)



- 62 % (73/118) of implementation plan
- IV CARIBE EWS SL course held Nov. 3-7, 2014 (17 MS/Operators) in PR
- Bimonthly conference calls/webinars w/ operators



# Caribbean Sea Level Stations Monitored by PTWC



Sea Level Stations –  
increase from 5 to 74  
stations – tsunami  
detection dropped from  
3 hours to 5-30 minutes



# IOC Sea Level Monitoring Facility

The screenshot displays the IOC Sea Level Monitoring Facility interface. At the top left are the UNESCO and IOC logos. The main title is "SEA LEVEL STATION MONITORING FACILITY". Below the title is a navigation menu with "Intro", "Map", "Station lists", "Station details", and "Services". The "Map" tab is selected. The page shows "Sealevel stations" with a status timestamp of "2015-12-08 02:37 GMT". A map of the Indian Ocean region is shown with various sea level stations marked by colored squares and circles. A legend on the right explains the symbols: red squares for offline/outdated stations, green circles for online stations, and blue circles for stations not available at the site. It also provides instructions on how to interact with the map, such as clicking for details and using Shift-key for zooming.

UNESCO  
IOC

## SEA LEVEL STATION MONITORING FACILITY

Intro Map Station lists Station details Services

Sealevel stations

Status at 2015-12-08 02:37 GMT

Disclaimer Type Active stations

Legend:

- Station is offline, or data is outdated
- Station is online
- Station is not available at this site

Offline = No data received since 3 times the transmit interval.

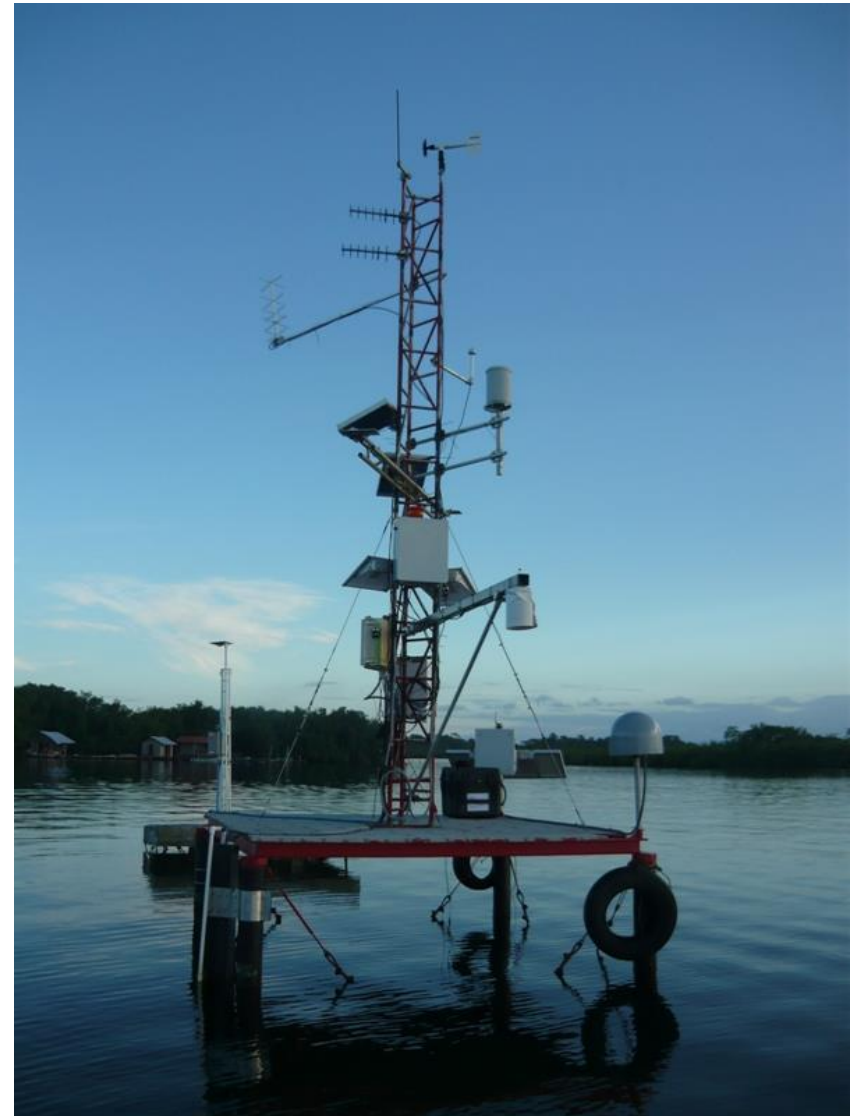
The status is checked every 5 minutes.

The quality of the transmitted data is not checked.

- To obtain more details about a station - move mouse over station and click.
- To zoom in - hold down the Shift-key while holding down the mouse button and drawing a rectangle or use the Small mouse button.

# Sea Level Stations Panama

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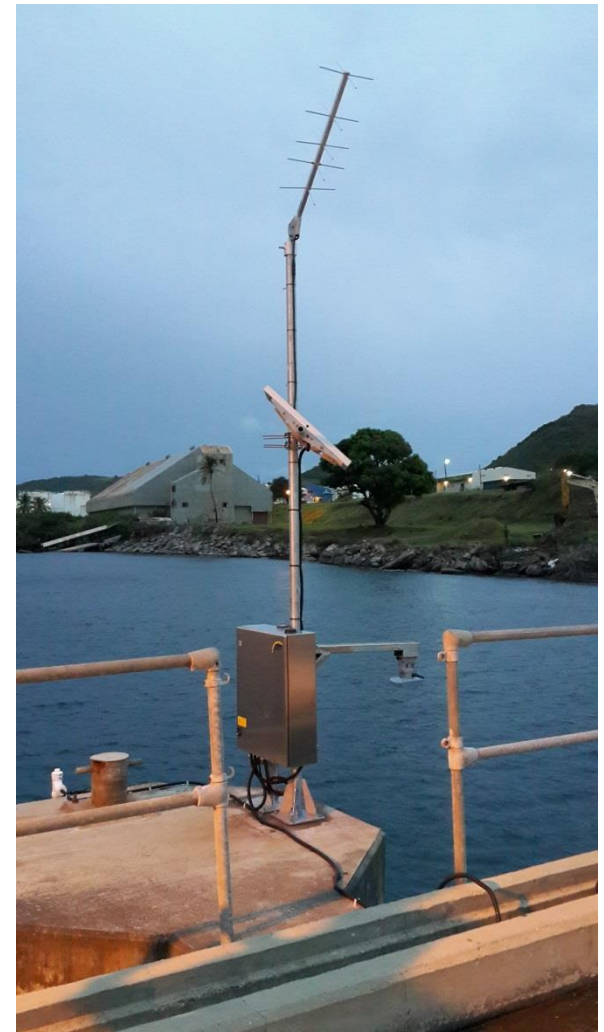
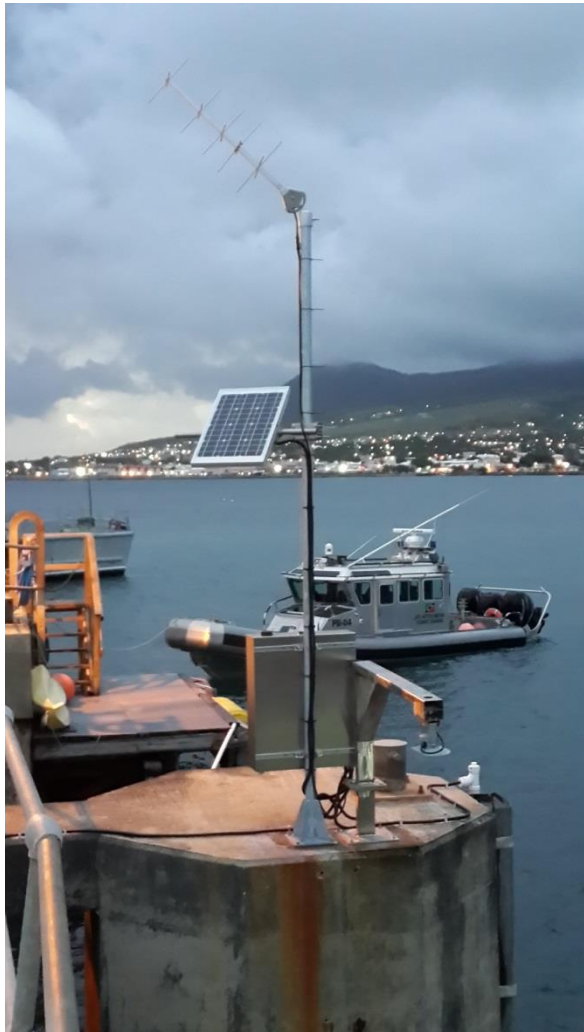
# Sea Level Station – St. Kitts

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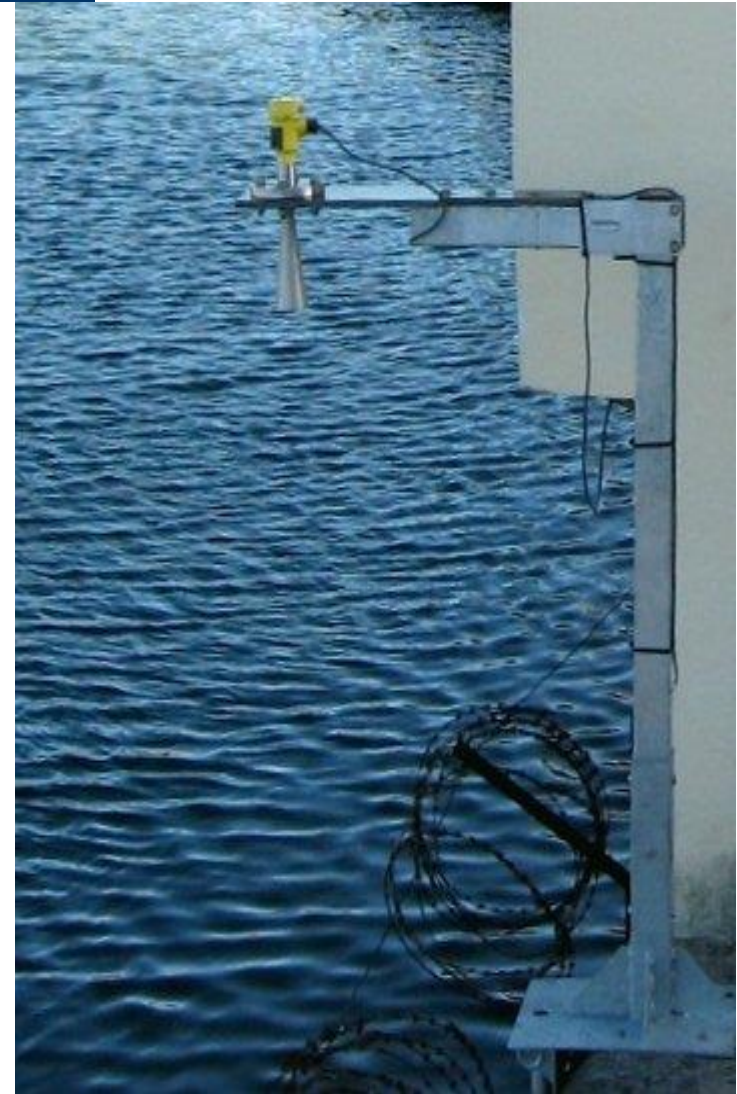
# St. Kitts Sea Level Monitoring Station

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# Dominican Republic Sea Level Station



# Haiti Sea Level Station

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# Sea Level Station Aruba

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# Sea Level Station Cayman Islands

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# French Network - Guadeloupe

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# ESTACIONES METEOROLÓGICAS Y OCEANOGRÁFICAS AUTOMÁTICAS SATELITALES - SMPOMM



## SENSORES ESTACIONES EMMAS

SENSOR/NOMBRE	UNIDAD DE MEDIDA
TEMPERATURA AMBIENTE (temperatura del aire)	°C
PRESION ATMOSFÉRICA (presión barométrica)	Hpa.
RADIACIÓN SOLAR (radiación global)	Watts /m2
DIRECCIÓN DEL VIENTO (dirección del viento)	Grados 0-360°
HUMEDAD RELATIVA (humedad del aire)	%
PRECIPITACIÓN (precipitación acumulada)	mm
VELOCIDAD DEL VIENTO(velocidad del viento)	m/s
RLS (sensor de nivel de radar)	m
PLS (sensor de nivel de presión)	m
BURBUJEO (sensor de nivel de presión)	m



# Puerto Rico – Red Sismica

Se le añadió un radio WLAN-110-24.



Se le cambio el poste que sostiene el anemometro y los paneles solares

## Comments [»](#)

1. Se intento reestablecer la comunicacion, pero no se pudo. Se probó dos radios (Satlink) pero el problema continúa.

Comment by Jose Cancel — March 21, 2010 @ [5:22 am](#)

2. El 5 de abril del 2010 se instalo un radio Wilan en el mareografo y en la UPRA. Ahora los datos se pueden bajar por una linea adicional de Ethernet.

Comment by Jose Cancel — May 3, 2010 @ [3:29 pm](#)

3. El 12 de julio de 2010 se le inslatao un panel solar de mas potencia.

Comment by Jose D. Cancel — August 15, 2010 @ [6:46 pm](#)

4. A esta estacion se le añadió un panel solar de mas potencia.

Comment by Jose Cancel — October 7, 2010 @ [7:08 pm](#)

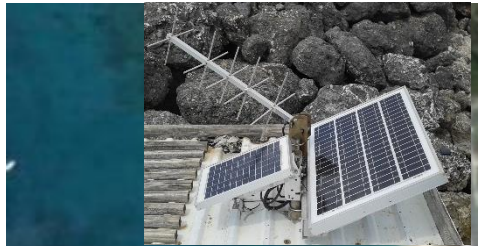
5. El 21 de diciembre de 2011 se le cambio el poste del anemometro. Se aumento la altura del mismo de 20' a 40'.

Comment by Jose Cancel — December 22, 2011 @ [11:34 am](#)



# CZMU Sea level Station Port St. Charles, Barbados

Station Code:	PTSC
Lat	13° 15'46.73"N (obtained from google earth)
Long	59° 38'41.47"W (obtained from google earth)
Date Installed	Installed November 2012 by CZMU and CIMH.
Status	Transmitting (power issue needs resolving)
Operator:	Coastal Zone Management Unit, Barbados.



Communications	GOES
GOES PID	BAB00078
WMO Header	SOBR10
GOES Channel	219
Transmit Period	5 mins
Sampling Rate	1 min
GLOSS Station ID	
DCP	Satlink2 V2 Transmitter/Logger (SL2-G312-V2)
GPS (timing)	Yes
GPS (high precision for positioning)	No
Sensor #1	ACCULEVEL SUBMERSIBLE TRANSDUCER (needs replacing)
Sensor #2	Accubar Bubble Gauge
Sensor #3	RADAR (RLR-0003-1)
Met Sensors	None



# Trinidad and Tobago Sea Level Stations

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- The tidal stations operated by the Hydrographic unit are Microcom GTX data loggers with the ability to transmit real time data to GOES.



# Barbuda

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# Sea Level Stations – St. Lucia (MACC, non operational)

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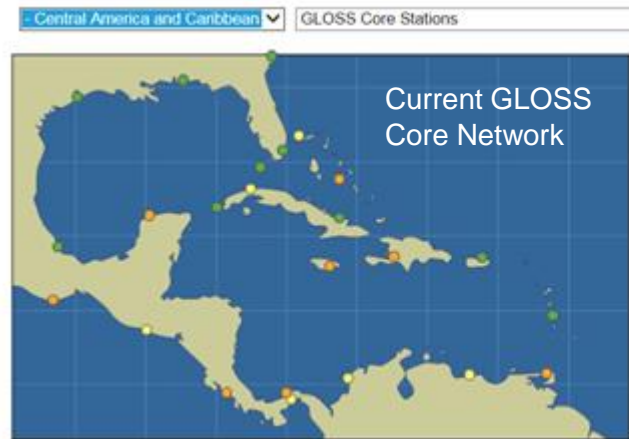
# Future Plans w/ funding from UK...

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# Other Sea Level Considerations

- **Success in increasing and sustaining more stations – Member State engagement and new stakeholders/donors (eg. Smithsonian Institution, UNAVCO, Monaco, Brazil, St. Vincent and the Grenadines)**
- **CARIBE EWS WG Vice Chair Sea Level (Sebastien Deroussi), CTWP Manager (Christa von Hillebrandt) and GLOSS Chair (Gary Mitchum) reviewing GLOSS Core List for Caribbean, going to recommend some swaps and additions**



Blue circles, proposed new sites for GLOSS Core Network



- **Category 1:** "Operational" stations for which the latest data is 2006 or later.
- **Category 2:** "Probably operational" stations for which the latest data is within the period 1996-2005.
- **Category 3:** "Historical" stations for which the latest data is earlier than 1996.
- **Category 4:** "Stations for which no PSMSL data exist."

# Maintenance Challenges

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## Challenges

- Maintenance**
  - Biogrowth
  - Sedimentation
- Power**
- Sensor malfunction**
- Vandalism**

# Opportunities – Multiple Applications

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- ❑ **Tsunami detection**
- ❑ **Storm surge**
- ❑ **Climate Change**
- ❑ **Seiches - Meteotsunamis**
- ❑ **Coastal Zone Management**
- ❑ **Navigation**
- ❑ **Bathymetric studies/Maritime Surveys**



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# Thank You

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**Laura Kong**  
UNESCO/IOC – NOAA International Tsunami Information Center